THE CO-OPERATIVE UNIVERSITY OF KENYA

END OF SEMESTER EXAMINATION APRIL -2023

EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE, INFORMATION TECHNOLOGY
(YR III SEM II)

UNIT CODE: BCSC 3225

UNIT TITLE: ARTIFICIAL INTELLIGENCE

DATE: FRIDAY, 28TH APRIL, 2023

TIME: 2:00 PM – 4:00 PM

INSTRUCTIONS:
- **Answer question ONE (compulsory) and any other TWO questions**

QUESTION ONE

(a) Describe the concept of rationality as applied in Artificial Intelligence.   **[3 Marks]**

(b) Discuss any three disciplines that contributed to the development of AI.   **[6 Marks]**

(c) Rewrite the following statements in a knowledge Base (KB) to First Order Predicate language:
  - i.   All lions are carnivorous   **[4 Marks]**
  - ii.   Lions do not eat some species of gazelles   **[4 Marks]**

(d) Discuss the four key parameters for evaluating a Search method used in Problem-Solving techniques used in Artificial Intelligence.   **[4 Marks]**

(e) Imagine you are a knowledge engineer developing an expert system for animal identification. The expert system is to be used as a learning aid in primary schools. The system should ask questions concerning the animal, such as appearance, behaviour, habitat, and so on, and then attempt to identify the animal in question.

Give examples of how you would represent knowledge about 2 possible animals in the system, for example cows and pigeons in the knowledge base, using:
  - **i.**   Rules.   **[3 Marks]**
  - ii.   Frames.   **[3 Marks]**
  - **iii.** Semantic Networks.   **[3 Marks]**

QUESTION TWO

(a) Using example search algorithms in each case, differentiate between informed and uninformed problem-solving techniques.   **[10 Marks]**

(b) Consider a robot that is used to load goods in a truck such that the robot has to identify the goods, pick them from the shelves and appropriately load it onto a truck. This being an example of a search problem, describe the five elements that could be used to specify such a problem.   **[10 Marks]**

QUESTION THREE

(a) With the aid of a well labeled diagram, discuss the architecture of Expert Systems.

[8 Marks]

(b) Discuss the three components of knowledge of Expert Systems. **[6 Marks]**

(c) With the aid of a diagram, discuss the architecture of a knowledge-based agent.**[6 Marks]**

QUESTION FOUR

(a) With the aid of clear diagrams supported by explanations, explain the general model of a learning agent. **[12 Marks]**

(b) Assume that a Nairobi city Matatu driver is an agent. Design this kind of a driver**.

[8 Marks]

QUESTION FIVE

(a) Outline any five different sets of environment types that intelligent agents can be subjected to.

[5 Marks]

(b) With respect to six sets of environments discussed in (a), compare the nature of an internet shopping agent's environment to that of a taxi (vehicle driver) agent. **[10 Marks]**

(c) A Prolog program is made up of two types of phrases (also known as *clauses*). With examples in each case discuss the two phrases. **[5 Marks]**